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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,422	03/10/2004	John Frederick Ackerman	122802-3	4370

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EXAMINER	
TUROCY, DAVID P	

ART UNIT	PAPER NUMBER
1762	

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/797,422	ACKERMAN ET AL.	
	Examiner	Art Unit	
	David Turocy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, filed 3/24/2005, with respect to the Oath/Declaration have been fully considered and are persuasive. The objection of the oath/declaration has been withdrawn.

2. Applicant's argument, filed 3/24/2005, with respect to the drawing has been fully considered and is persuasive. The objection to the drawing has been withdrawn.

3. Applicant's arguments filed 3/24/2005, with respect to claims 1-7 have been fully considered but they are not persuasive.

The applicant has argued against the Spence et al reference stating that is does not teach infiltrating the outer layer, but rather teaches coating the substrate. The examiner respectfully disagrees, infiltrating, is defined by Webster's online dictionary as "to cause to permeate something" and impregnating is defined as "to cause to be permeated". Therefore, it is the examiners position that infiltrating is synonymous with impregnating and the art does no recognize any distinction between coating and impregnating. *In re Marra et al.*, 141 USPQ 221.

The applicant has argued that there is no motivation to combine Spence et al. and Hasz et al. The applicant has argued that the contaminants addressed by Spence et al, carbon deposits, are not similar to the contaminants addressed by Hasz, CMAS deposits, and one skilled in the art would not consider the teaches of Hasz et al relevant

to Spence et al. Hasz et al is utilized here to show that thermal barrier coatings comprising an alumina barrier layer and a bond coating are susceptible to various modes of damage from containments. Hasz discloses the contaminants as materials that are in the engine, which deposit on the surface of the engine part, from air and fuel sources, and impurities to oxidation products and only uses CMAS as an exemplary showing (Paragraph 2, lines 20-21 and 32-35). The examiner agrees Spence et al. is directed to carbon deposits, more particularly, carbon deposits on fuel contacting surfaces located in high temperature zones of gas turbine engines, where the carbon deposits are a side effect of the fuels being consumed within the engine (Column 1, lines 11-25). Therefore it is the examiners position that the Spence et al and Hasz et al are relevant art because they both teach of protecting turbine engine parts from contaminants. Spence teaches applying an n alumina/silicon coating protects various substrates, including ceramic, from contaminants and Hasz teaches thermal barrier coatings, with outer layers of ceramic, benefit from a contaminant protective coating.

The applicant has argued against the Hasz et al reference stating that is does not teach infiltrating the outer layer, but rather teaches coating the substrate. The examiner respectfully disagrees, infiltrating, is defined by Webster's online dictionary as "to cause to permeate something" and impregnating is defined as "to cause to be permeated". Therefore, it is the examiners position that infiltrating is synonymous with impregnating and the art does no recognize any distinction between coating and impregnating. *In re Marra et al.*, 141 USPQ 221.

The applicant has argued against the Ceramic and Glasses reference stating that is does not teach forming finely divided alpha alumina. However, the prior art and the present claims, reflected by claim 26, teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by thermally converting the aluminum alkoxide to alpha alumina, it must necessarily result in finely divided alpha alumina. Either 1) the applicant and the prior art have different definitions for an alpha alumina thermally converted from aluminum alkoxide, or 2) the applicant is using other process steps or parameters that are not shown in the claims.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 17-25 and 27-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5324544 by Spence et al. ("Spence") in view of US Patent 5871820 by Hasz et al. ("Hasz").

Claims 17-18, 23 and 31: Spence teaches of a method for protecting a metal gas turbine component from environmental contaminants using an alumina-silica coating (abstract). Spence discloses application of the mixed oxide coating to various substrates, including ceramics and metal alloys (Column 4, lines 27-42). Spence discloses providing an alumina precursor that will yield an aluminum oxide upon deposition to a substrate and a subsequent heat treatment from 1200 °F to 1500°F for complete curing of the coating (Column 4, lines 23-26, Claim 12).

Claims 19-22: Spence discloses using organo-metallic compounds, such as aluminum alkoxides, for example aluminum sec-butoxides, ethoxides, and methoxides (Column 5, lines 11-17). Spence discloses using a sol comprising 78.3 parts methyl alcohol, 4.4 parts silica sol, and 17.3 parts aluminum sec-butoxide (Column 8 line 69 – Column 9 line 2). Spence discloses immersing a substrate in a sol and then firing for 5 hours at 1112 °F (Column 8, lines 58-64).

Claims 27-28: Spence discloses using an aqueous compositing including a solution of water and an organic solvent, such as organic alcohols, aldehydes, and ketones (Column 5, lines 21-29).

Spence fails to teach protecting a thermal barrier coating comprising a non-alumina ceramic layer and a bond coat layer.

Hasz, teaching of a method for protecting a thermal barrier coating from environmental contaminants, discloses providing a metal substrate with a thermal barrier coating consisting a ceramic layer, frequently yttria-stabalized zirconia, on a bond coat (Abstract, Column 1, lines 19-56). Hasz further teaches a protective layer is needed on thermal barrier coatings because they are susceptible to various modes of damage from environmental contaminants (Column 1, lines 45-56). Hasz discloses using a dense impermeable barrier comprising metal oxides such as alumina (Column 2, lines 28-31, Column 3, lines 46-50). Hasz discloses depositing the impermeable barrier by coating methods known in the art such as sol-gel, sputtering, air plasma spray, etc. (Column 4, lines 25-30).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Spence to use the protective coating on a thermal barrier coating suggested by Hasz to provide a desirable protection from environmental contaminants because Spence teaches applying an alumina/silicon coating protects various substrates, including ceramic, from contaminants and Hasz teaches thermal barrier coatings, with outer layers of ceramic, benefit from a contaminant protective coating.

Claims 24 and 25: Spence in view of Hasz fails to disclose heating the aluminum alkoxide to a temperature or 1200 to 1500°F for at least 4 hours. However, Spence discloses immersing a substrate in a sol and then firing for 5 hours at 1112 °F (Column 8, lines 58-64). Spence also discloses a heat treatment from 1200 °F to 1500°F for complete curing of the coating (Claim 12). Therefore it is the examiners position that the length of time for a heat treatment is a result effective variable, as not enough time would not provide properly cure the coating providing the desired protective properties and too much time would not off additional benefits of more protection against environmental contaminants.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimal heat treatment time, in the process of Spence in view of Hasz, through routine experimentation, to provide the desired protective layer on a thermal barrier coating. It is well settled that determination of optimum values of these process parameters is within the skill of one practicing in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Claims 29 and 30: Spence in view of Hasz fails to disclose treating the outer layer for a period of time from 1 to 5 minutes. However, Hasz discloses the importance of determining the appropriate coating thickness, where thick and thin coatings are possible (Column 4, lines 25-36). Therefore it is the examiners position that the length of treatment is a result effective variable, as not enough time would provide a less than

desired coating thickness resulting in poor protective properties and too much time would provide a coating thickness which does not offer additional benefit of more protection.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimal treatment time, in the process of Spence in view of Hasz, through routine experimentation, to provide the desired protective coating thickness onto the thermal barrier coating. It is well settled that determination of optimum values of these process parameters is within the skill of one practicing in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).

4. Claims 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5324544 by Spence et al. ("Spence") in view of US Patent 5871820 by Hasz et al. ("Hasz") and further in view of Ceramics and Glasses.

Spence in view of Hasz teach all the limitations of this claim, except they fail to explicitly disclose thermally converting the aluminum alkoxide to alpha alumina.

However, Ceramics and Glasses, discloses Al_2O_3, also known as alumina, is produced by heating hydrates of alumina through transitional structures to its final form, where all the transitional structures are transformed irreversibly to α- Al_2O_3, the only stable form at high temperatures (Page 752).

Therefore, it is the examiners position that the thermal treatment of Spence in view of Hasz inherently converts the aluminum alkoxide to an alpha alumina because it

is disclosed by Ceramics and Glasses that alpha alumina results from thermal treatment of all aluminum hydrates.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER